REMARKS

The Examiner indicates that the drawings filed together with the application on January 2, 2001, are acceptable.

Further, the Examiner has acknowledged the claim for foreign priority under 35 U.S.C. §119, as well as receipt of the certified copies of the priority documents.

Claims 2, 3, 6-9 and 12-23 presently are pending in the application, with claims 12-21 being withdrawn from consideration as being directed to a non-elected invention (i.e., the method of making a circuit board). Applicants duly affirm the election of Group 1, claims 1-11, without traverse, in response to the present Office Action. Further, Applicants have canceled claims 1, 4, 5, 10 and 11 and added new claims 22 and 23.

Claims 1 and 2 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,899,439 (Potter et al.). Claims 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Potter et al. in view of U.S. Patent No. 6,115,262 (Brunner et al.). Claims 5-7, 9 and 10 stand rejected under § 103(a) as being unpatentable over Potter et al. in view of U.S. Patent No. 6,229,404 (Hatanaka). Finally, claims 8 and 11 stand rejected under § 103(a) as being unpatentable over Potter et al. in view of Hatanaka as applied to claims 5 and 6 above, and further in view of Brunner et al. For the following reasons, these rejections are respectfully traversed.

An apparatus consistent with the present invention relates to a circuit board comprising a dielectric substrate 11, a grounding surface 13 formed on at least one surface of the dielectric substrate, and transmission lines 20 formed on one surface of the dielectric substrate for

transmitting electrical signals. At least a portion of each of the transmission lines is isolated from an upper surface of the dielectric substrate to reduce an effective permittivity between the transmission lines and the grounding surface and reduce dielectric loss (see, for example, Figures 3 and 4).

A cap 40 may be included which covers the transmission lines, with one end of the cap being grounded to the grounding surface (see, for example, Figures 5 and 6).

In the rejection of claims 1 and 2 under § 102(b), the Examiner maintains that Potter et al. (hereinafter "Potter") disclose all of the elements set forth in the noted claims including a dielectric substrate 30, a grounding surface 20 formed on at least one surface of the dielectric substrate, and transmission lines 14 formed on one surface of the dielectric substrate for transmitting electrical signals, wherein at least a portion of each of the transmission lines is isolated from an upper surface of the dielectric substrate to reduce an effective permittivity between the transmission lines and the grounding surface and reduce dielectric loss. The Examiner also maintains that a plurality of supporters (16, 18) for supporting the transmission lines are included between the dielectric substrate and each of the transmission lines.

Referring to Figure 1, Potter discloses a high-density electrical interconnect system including a plurality of X conductors 12 running at right angles to a plurality of Y conductors 14. The X conductors 12 are supported from a plurality of metal pillars or support posts 16, and the Y conductors 14 are supported from a plurality of metal pillars or support posts 18. The X conductors 12 are separated from the ground plane 20 by the height of the X pillars 16, and the Y conductors 14 are supported by their own higher height pillars 18 above X conductors 12. Both

the X pillars 16 and the Y pillars 18 are electrically isolated from the ground plane by virtue of openings or a moat hole 22 in the ground plane 20 around each pillar 16 and 18. The metal ground plane 20 provides a controlled impedance for the X conductors 12.

With respect to dependent claims 3 and 4, the Examiner further relies on the secondary teaching of Brunner et al. (hereinafter "Brunner") to teach the installation of a pad 24 at at least one end of each of the transmission lines 12. The Examiner concludes that it would have been obvious to one of ordinary skill to install a pad at the end of each transmission line in the device of Potter in view of the secondary teaching of Brunner.

Regarding the rejection of claims 5-7, 9 and 10 under § 103(a), the Examiner acknowledges that Potter does not disclose the use of a cap for covering the transmission lines, but then relies on the secondary teaching of Hatanaka for the use of a cap 6 for covering an entirety of a circuit board, with the end of the cap being grounded to the grounding surface of the circuit board (referencing column 9, lines 35-40).

Referring to Figure 1, Hatanaka discloses a crystal oscillating element 2 mounted on the top surface of the main body 1 hermetically sealed by a metal cover 6 which is brought into close contact with and welded with a seam member 36 bonded to a sealing conductor pattern 19 on the top surface of the main body 1 by wax. As shown in Figure 1 and described in column 9, beginning at line 35, the external terminal electrode 13 at ground potential and the sealing conductor pattern 19 are connected by via hole conductors penetrating through the ceramic layers 1a to 1d.

Claim 2 and claim 6 have been placed in independent form. Further, the new independent claim 2 and new independent claim 6 have been amended to specify that the supporters are dielectric supporters in order to differentiate over the metal pillars of Potter. In addition to canceling independent claims 1 and 5, dependent claims 4, 10 and 11 have been canceled to avoid redundancy. Further, two new dependent claims 22 and 23 have been added to depend from newly rewritten claims 2 and 6, respectively, to further specify that the dielectric supporters are formed of a polymer to reduce electrical loss.

Clearly, Potter, whether taken alone or in combination with the remaining secondary references, fails to teach or suggest the use of a plurality of dielectric supporters for supporting the transmission lines.

With respect to dependent claim 9, the Examiner acknowledges that Potter as modified by Hatanaka does not specifically teach the grounding surface formed on an opposite surface of the dielectric substrate and the conducting electrode installed, one end of which is connected to the cap and the other being grounded to the grounding surface through the dielectric substrate so that the cap is grounded to the grounding surface. However, the Examiner maintains that it would have been obvious to rearrange the parts since such rearrangement involves only routine skill in the art [case cite omitted]. The Examiner also notes that Hatanaka discloses a grounding surface on the opposite side of a dielectric substrate remote from a cap.

However, Potter, whether taken alone or in combination with Hatanaka, simply does not teach the specific structure recited in claim 9, but rather discloses a complicated series of ceramic insulating layers 1a to 1d utilizing via hole conductors and wiring conductors to connect a

terminal electrode 13 at ground potential to a sealing conductor pattern 19 which in turn is connected through seam member 36 to the cap 6.

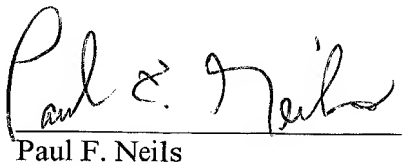
Dependent claim 9 has been placed in independent form (i.e., claims 5+6+7+9) and is clearly patentable over the applied prior art references.

The dependent claims are patentable by virtue of their dependency on independent claims 2 and 6, respectively.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 1, 4, 5, 10 and 11 are canceled.

The claims are amended as follows:

2. (Amended) A [The] circuit board [of claim 1,] comprising: a dielectric substrate, a grounding surface formed on at least one surface of the dielectric substrate, and transmission lines formed on one surface of the dielectric substrate for transmitting electrical signals, wherein at least a portion of each of the transmission lines is isolated from an upper surface of the dielectric substrate to reduce an effective permittivity between the transmission lines and the grounding surface and reduce dielectric loss; and further comprising a plurality of dielectric supporters for supporting the transmission lines, between the dielectric substrate and each of the transmission lines in order to isolate the transmission lines a predetermined interval apart from the upper surface of the dielectric substrate.

6. (Amended) A [The] circuit board [of claim 5,] comprising: a dielectric substrate, a grounding surface formed on at least one surface of the dielectric substrate, and transmission lines formed on one surface of the dielectric substrate for transmitting electrical signals, wherein at least a portion of each of the transmission lines is isolated from the upper surface of the dielectric substrate to reduce an effective permittivity between the transmission

lines and the grounding surface and reduce dielectric loss, and a cap which covers the transmission lines, one end of the cap being grounded to the grounding surface; and further comprising a plurality of dielectric supporters for supporting the transmission lines, between the dielectric substrate and each of the transmission lines in order to isolate the transmission lines a predetermined interval apart from the upper surface of the dielectric substrate.

9. (Amended) A [The] circuit board [of claim 7,] comprising: a dielectric substrate, a grounding surface formed on at least one surface of the dielectric substrate, and transmission lines formed on one surface of the dielectric substrate for transmitting electrical signals, wherein at least a portion of each of the transmission lines is isolated from the upper surface of the dielectric substrate to reduce an effective permittivity between the transmission lines and the grounding surface and reduce dielectric loss, and a cap which covers the transmission lines, one end of the cap being grounded to the grounding surface;

and further comprising a plurality of supporters for supporting the transmission lines, between the dielectric substrate and each of the transmission lines in order to isolate the transmission lines a predetermined interval apart from the upper surface of the dielectric substrate, wherein an inside of the cap is in a vacuum state; and wherein the transmission lines are installed on one surface of the dielectric substrate, the grounding surface is formed on an opposite surface of the dielectric substrate, and a conducting electrode is installed, one end of which is connected to the cap and the other is grounded to the grounding surface through the dielectric substrate so that the cap is grounded to the grounding surface.

Claims 22 and 23 are added as new claims.